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ABSTRACT

The United States Training and Employment Service Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is also included. (RC)

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Technical Report on Development of USES Specific Aptitude Test Battery for Teacher Aid, Elementary School (education) 099.368

S-398R74

Developed in cooperation with the
Alabama, Arkansas, Iowa, Louisiana,
Michigan, North Carolina, Oregon,
Pennsylvania, Texas, Utah, Virginia
and West Virginia
State Employment Services

U.S. DEPARTMENT OF HEALTH
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October 1974

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Development of USES Specific Aptitude Test Battery S-398R74

for

Teacher Aid, Elementary School (education) 099.368

RESEARCH SUMMARY

This report describes the research which resulted in the development of the following Specific Aptitude Test Battery for use in selecting inexperienced or untrained individuals for training as Teacher Aids:

Aptitudes	Cutting Scores
V - Verbal Aptitude	80
N - Numerical Aptitude	80
Q - Clerical Perception	100
K - Motor Coordination	105

Sample:
260 females and six males employed as Teacher Aids by various school systems in the North, South and West (see Appendix 2). A total of 105 were minority group members (91 Blacks, 10 Spanish Surnamed and 4 American Indians) and 161 were nonminority group members.

Criterion:
Supervisory ratings. Criterion data were collected during 1973.

Design:
Concurrent (test and criterion data were collected at approximately the same time).

Concurrent Validity:
Phi coefficient for total sample = .19 ($P/2 < .005$)
Phi coefficient for the Black subsample = .28 ($P/2 < .005$)
Phi coefficient for nonminority subsample = .15 ($P/2 < .05$)

Effectiveness of Battery for Total Sample:
For the total sample, 60% of the nontest-selected individuals in this study were in the high criterion group; if they had been test-selected, 68% would have been in the high criterion group. 40% of the nontest-selected individuals in this study were in the low criterion group; if they had been test-selected, 32% would have been in the low criterion group. The effectiveness of the battery is shown in Table 1.

TABLE 1

Effectiveness of Battery for Total Sample

	Without Tests	With Tests
High Criterion Group	60%	68%
Low Criterion Group	40%	32%

Comparison of Minority and Nonminority Groups:
No differential validity for this battery was found. The difference between the phi coefficients for Black and nonminority groups is not statistically significant (CR = 1.08). The battery is fair to Blacks, since the percent of Blacks who met the cutting scores approximated the percent who were in the high criterion group; 42% of the Blacks met the cutting scores and 52% were in the high criterion group.

JOB ANALYSIS

A job analysis was performed by observation of the workers' performance on the job and in consultation with the workers' supervisors. On the basis of the job analysis, the job description shown in Appendix 4 was prepared which was used to (1) select an experimental sample of workers who were performing the job duties; (2) choose an appropriate criterion or measure of job performance; (3) determine which aptitudes are critical, important, or irrelevant to job performance (see Tables 2 and 5); and (4) provide information on the applicability of the test battery resulting from this research.

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TABLE 2

Qualitative Analysis

Aptitude	Rationale
G - General Learning Ability	Required to understand instructions, give instructions and make judgments.
V - Verbal Aptitude	Required to communicate with students, parents and teachers, read to the class from books and provide remedial help in reading.
N - Numerical Aptitude	Required in performing arithmetic computations when scoring and grading papers and in providing remedial help in mathematics.
Q - Clerical Perception	Required to score tests for errors and omissions, check practice exercises, record grades in the register, transpose grades to report cards and maintain other records.
K - Motor Coordination	Required to operate audio-visual and office equipment, make learning aids, help keep the room in order and direct and participate in play activity.

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002B were administered during 1973.

CRITERION

The immediate supervisor rated each worker. The ratings were obtained by means of personal visits of State Test Development Analysts who explained the rating procedure to the supervisors. Two ratings were obtained from each supervisor with an interval of two weeks between the ratings. Since sample members' test scores are confidential, supervisors had no knowledge of the test scores of the workers.

A descriptive rating scale was used. The scale (see Appendix 3) consists of 6 items. Five of these items cover different aspects of job performance. The sixth item is a global item on the Teacher Aid's "all-around" ability. Each item has five alternatives corresponding to different degrees of job proficiency. For the purpose of scoring the items, weights of 1 to 5 were assigned to the responses. The total score on the rating scale is the sum of the weights for the six items. The possible range for each rating is 6-30.

A review of the job description indicated that the subjects covered by the rating scale were directly related to important aspects of job performance:

A. Amount of work: Teacher Aids must be efficient in order to provide adequate assistance in working with a relatively large number of students, some of whom require extra help.

B. Quality of work: Teacher Aids must be able to provide assistance to students and provide appropriate assistance to the teacher.

C. Accuracy of work: Teacher Aids must accurately assist students, accurately score homework and tests, and record grades without error.

D. Knowledge of work: Teacher Aids must understand the principles, equipment, materials and methods of the job in order to assist the teacher adequately.

E. Variety of job duties: Teacher Aids must perform a wide range of preparatory, instructional, supportive and clerical job duties in order to assist the teacher adequately.

F. "All around" ability: Teacher Aid's value to the teacher involves a combination of the aspects of job performance listed above.

A reliability coefficient of .72 was obtained between the initial ratings and the re-ratings, indicating a significant relationship. Therefore, the final criterion score consists of the combined score of the two ratings. The possible range for the final criterion is 12-60. The mean is 46.4 and the standard deviation 8.3. The relationship between the criterion and age, education and job experience is shown in Table 3.

TABLE 3

Means, Standard Deviations (SD) and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Experience

Total Sample

	Mean	SD	r
Age (years)	37.2	11.1	.016
Education (years)	12.9	1.7	.208**
Experience (months on current job)	35.1	28.7	.093

**Significant at the .01 level

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About one-third of the workers are considered to be marginal workers. Therefore, the criterion distribution was dichotomized so as to include as close as possible to one-third of the sample in the low criterion group and the remainder in the high criterion group. The criterion cutting score was set at 46 which places 40% of the sample in the low criterion group and 60% in the high criterion group. It was not possible to place precisely one-third of the workers in the low criterion group because of the nature of the criterion distribution.

SAMPLE

The sample consisted of 260 females and 6 males employed as Teacher Aids at various institutions in the North, South and West (see Appendix 2). A total of 105 were minority group members(91 Blacks, 10 Spanish Surnamed and 4 American Indians) and 161 were nonminority group members. All sample members were nontest-selected. The means and standard deviations for age, education and experience of sample members are shown in Table 3. All workers had been employed at least one month in jobs with duties similar to those shown in the job description in Appendix 4. Descriptive statistics for subgroups are shown in Appendix 1.

STATISTICAL RESULTS

TABLE 4

Statistical Results for Total Sample

N=266

Aptitude	Mean	SD	r
G - General Learning Ability	96.6	17.1	.291**
V - Verbal Aptitude	99.8	16.2	.298**
N - Numerical Aptitude	97.6	16.9	.178**
S - Spatial Aptitude	96.0	17.4	.254**
P - Form Perception	108.2	19.9	.183**
Q - Clerical Perception	116.1	18.4	.244**
K - Motor Coordination	112.0	16.0	.134*
F - Finger Dexterity	95.7	20.7	.041
M - Manual Dexterity	100.5	22.7	.119

*Significant at the .05 level
**Significant at the .01 level

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
"Critical" on Basis of Job Analysis									
"Important" on Basis of Job Analysis	X	X	X			X	X		
"Irrelevant" on Basis of Job Analysis									
Relatively High Mean					X	X	X		
Relatively Low Standard Deviation									
Significant Correlation with Criterion	X	X	X	X	X	X	X		
Aptitudes Considered for Inclusion in the Battery	G	V	N	S	P	Q	K		

The information in Table 5 indicates that the following aptitudes should be considered for inclusion in the battery: G, V, N, S, P, Q and K. The objective is to develop a battery of 2, 3 or 4 aptitudes with cutting scores set at five point intervals at the point (a) where about the same percent will meet the cutting scores as the percent placed in the high criterion group and (b) which will maximize the relationship between the battery and the criterion. The cutting scores are set at approximately one standard deviation below the mean aptitude scores of the sample with deviations above or below these points to achieve the objectives listed above.

The following battery resulted:

Aptitudes	Cutting Scores
V - Verbal Aptitude	80
N - Numerical Aptitude	80
Q - Clerical Perception	100
K - Motor Coordination	105

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VALIDITY OF BATTERY

TABLE 6
Validity of Battery for Total Sample

	Below Cutting Scores	Meeting Cutting Scores	Total
High Criterion Group	62	97	159
Low Criterion Group	62	45	107
Total	124	142	266

Phi coefficient = .19
Significance level = P/2 < .005

TABLE 6a
Validity of Battery for Black Subsample

	Below Cutting Scores	Meeting Cutting Scores	Total
High Criterion Group	21	26	47
Low Criterion Group	32	12	44
Total	53	38	91

Phi coefficient = .28
Significance level = P/2 < .005

TABLE 6b
Validity of Battery for Nonminority Subsample

	Below Cutting Scores	Meeting Cutting Scores	Total
High Criterion Group	36	67	103
Low Criterion Group	29	29	58
Total	65	96	161

Phi coefficient = .15
Significance level = P/2 < .05

OCCUPATIONAL APTITUDE PATTERN

This occupation was incorporated into OAP-39 in Section II of the 1970 edition of the Manual for the USES General Aptitude Test Battery as a "double asterisk" (**), because the cutting score for aptitude K in the battery is more than 10 points higher than the cutting score for aptitude K in OAP-39 but a significant phi coefficient was obtained between the criterion and the OAP-39 cutting scores of N-80, Q-95 and K-75. A phi coefficient of .10 ($P/2 < .05$) was obtained.

APPLICABILITY OF BATTERY

The aptitude test battery may be used in the selection of inexperienced applicants for the job described in Appendix 4.

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APPENDIX 1

Descriptive Statistics for Black and Nonminority Subgroups

	Black (N=91)			Nonminority (N=161)		
Variable	Mean	SD	Range	Mean	SD	Range
Aptitude G	85.2	13.5	53-124	103.5	15.8	55-141
Aptitude V	90.6	11.8	68-139	105.5	16.1	72-151
Aptitude N	87.8	15.1	46-115	103.8	15.5	56-143
Aptitude S	87.3	14.5	51-127	100.4	17.5	61-147
Aptitude P	100.4	20.6	57-158	112.7	18.5	74-165
Aptitude Q	108.0	16.3	66-153	120.9	18.3	86-184
Aptitude K	113.0	14.5	74-148	111.4	17.0	76-155
Aptitude F	84.4	16.7	43-122	100.6	20.0	51-171
Aptitude M	98.9	20.8	48-143	100.2	23.3	31-158
Criterion	44.6	8.0	29-59	47.4	8.3	28-60
Age	34.7	11.2	20-60	39.0	10.8	19-62
Education	13.0	1.4	8-16	12.8	1.8	7-17
Experience (months on current job)	41.8	30.8	2-156	31.9	27.5	1-204

APPENDIX 2

Geographic Distribution of Sample

	Total Sample	Black Subsample
North	95	31
South	153	58
West	18	2
Total	266	91

Organizations Contributing Samples

North:
Waterloo Community Schools, Waterloo, Iowa
Inkster Public Schools, Inkster, Michigan
River Rouge Board of Education, River Rouge, Michigan
Romulus Community Schools, Romulus, Michigan
Royal Oak School District, Royal Oak, Michigan
Warren Consolidated Schools, Warren, Michigan
York City School District, York, Pennsylvania

South:
Dothan City Schools, Dothan, Alabama
Gadsden City School System, Gadsden, Alabama
Phenix City Board of Education, Phenix City, Alabama
Thompson Elementary School, Siluria, Alabama
Thompson Middle School, Alabaster, Alabama
Little Rock School System, Little Rock, Arkansas
Avoyelles Parish School Board, Bunkie and Marksville, Louisiana
Carver Elementary School, Mount Olive, North Carolina
Wayne County Board of Education, Goldsboro, North Carolina
Wilson City Schools, Wilson, North Carolina
Amarillo Public Schools, Amarillo, Texas
Dallas Independent School District, Dallas, Texas
Prince Edward County Schools, Prince Edward County, Virginia
Washington County School Board, Washington County, Virginia
Kanawha County Schools, Kanawha, West Virginia

West:
Salem Public Schools, Salem, Oregon
Confederated Tribes of Warm Springs Reservation, Warm Springs, Oregon
Salt Lake City School District, Salt Lake City, Utah

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U.S. DEPARTMENT OF LABOR • MANPOWER ADMINISTRATION

DESCRIPTIVE RATING SCALE

SCORE _____

RATING SCALE FOR _____

D.O.T. Title and Code

Directions: Please read the "Suggestions to Raters" and then fill in the items which follow. In making your ratings, only one box should be checked for each question.

SUGGESTIONS TO RATERS

We are asking you to rate the job performance of the people who work for you. These ratings will serve as a "yardstick" against which we can compare the test scores in this study. The ratings must give a true picture of each worker or this study will have very little value. You should try to give the most accurate ratings possible for each worker.

These ratings are strictly confidential and won't affect your workers in any way. Neither the ratings nor test scores of any workers will be shown to anybody in your company. We are interested only in "testing the tests." Ratings are needed only for those workers who are in the test study.

Workers who have not completed their training period, or who have not been on the job or under your supervision long enough for you to know how well they can perform this work should not be rated. Please inform the test technician about this if you are asked to rate any such workers.

Complete the last question only if the worker is no longer on the job.

In making ratings, don't let general impressions or some outstanding trait affect your judgment. Try to forget your personal feelings about the worker. Rate only on the work performed. Here are some more points which might help you:

1. Please read all directions and the rating scale thoroughly before rating.

2. For each question compare your workers with "workers-in-general" in this job. That is, compare your workers with other workers on this job that you have known. This is very important in small plants where there are only a few workers. We want the ratings to be based on the same standard in all the plants.

3. A suggested method is to rate all workers on one question at a time. The questions ask about different abilities of the workers. A worker may be good in one ability and poor in another: for example, a very slow worker may be accurate. So rate all workers on the first question, then rate all workers on the second question, and so on.

4. Practice and experience usually improve a worker's skill. However, one worker with six months' experience may be a better worker than another with six years' experience. Don't rate one worker as poorer than another merely because of a lesser amount of experience.

5. Rate the workers according to the work they have done over a period of several weeks or months. Don't rate just on the basis of one "good" day, or one "bad" day or some single incident. Think in terms of each worker's usual or typical performance.

6. Rate only the abilities listed on the rating sheet. Do not let factors such as cooperativeness, ability to get along with others, promptness and honesty influence your ratings. Although these aspects of a worker are important, they are of no value for this study as a "yardstick" against which to compare aptitude test scores.

NAME OF WORKER *(Print)* *(Last)* *(First)*

SEX: MALE_____ FEMALE_____

Company Job Title: _____

How often do you see this worker in a work situation?

- ☐ All the time.
- ☐ Several times a day.
- ☐ Several times a week.
- ☐ Seldor

How long have you worked with this worker?

- ☐ Under one month.
- ☐ One to two months.
- ☐ Three to five months.
- ☐ Six months or more.

A. How much can this worker get done? (Worker's ability to make efficient use of time and to work at high speed.) (If it is possible to rate only the quantity of work which a person can do on this job as adequate or inadequate, use #2 to indicate "inadequate" and #4 to indicate "adequate.")

- ☐ 1. Capable of very low work output. Can perform only at an unsatisfactory pace.
- ☐ 2. Capable of low work output. Can perform at a slow pace.
- ☐ 3. Capable of fair work output. Can perform at an acceptable pace.
- ☐ 4. Capable of high work output. Can perform at a fast pace.
- ☐ 5. Capable of very high work output. Can perform at an unusually fast pace.

B. How good is the quality of work? (Worker's ability to do high-grade work which meets quality standards.)

- ☐ 1. Performance is inferior and almost never meets minimum quality standards.
- ☐ 2. Performance is usually acceptable but somewhat inferior in quality.
- ☐ 3. Performance is acceptable but usually not superior in quality.
- ☐ 4. Performance is usually superior in quality.
- ☐ 5. Performance is almost always of the highest quality.

C. How accurate is the work? (Worker's ability to avoid making mistakes.)

- ☐ 1. Makes very many mistakes. Work needs constant checking.
- ☐ 2. Makes frequent mistakes. Work needs more checking than is desirable.
- ☐ 3. Makes mistakes occasionally. Work needs only normal checking.
- ☐ 4. Makes few mistakes. Work seldom needs checking.
- ☐ 5. Rarely makes a mistake. Work almost never needs checking.

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D. How much does the worker know about the job? (Worker's understanding of the principles, equipment, materials and methods that have to do directly or indirectly with the work.)

☐ 1. Has very limited knowledge. Does not know enough to do the job adequately.

☐ 2. Has little knowledge. Knows enough to get by.

☐ 3. Has moderate amount of knowledge. Knows enough to do fair work.

☐ 4. Has broad knowledge. Knows enough to do good work.

☐ 5. Has complete knowledge. Knows the job thoroughly.

E. How large a variety of job duties can the worker perform efficiently? (Worker's ability to handle several different operations.)

☐ 1. Cannot perform different operations adequately.

☐ 2. Can perform a limited number of different operations efficiently.

☐ 3. Can perform several different operations with reasonable efficiency.

☐ 4. Can perform many different operations efficiently.

☐ 5. Can perform an unusually large variety of different operations efficiently.

F. Considering all the factors already rated, and only these factors, how good is this worker? (Worker's all-around ability to do the job.)

☐ 1. Performance usually not acceptable.

☐ 2. Performance somewhat inferior.

☐ 3. A fairly proficient worker.

☐ 4. Performance usually superior.

☐ 5. An unusually competent worker.

Complete the following ONLY if the worker is no longer on the job.

G. What do you think is the reason this person left the job? (It is not necessary to show the official reason if you feel that there is another reason, as this form will not be shown to anybody in the company.)

☐ 1. Fired because of inability to do the job.

☐ 2. Quit, and I feel that it was because of difficulty doing the job.

☐ 3. Fired or laid off for reasons other than ability to do the job (i.e., absenteeism, reduction in force).

☐ 4. Quit, and I feel the reason for quitting was not related to ability to do the job.

☐ 5. Quit or was promoted or reassigned because the worker had learned the job well and wanted to advance.

RATED BY	TITLE	DATE

COMPANY OR ORGANIZATION	LOCATION (*City, State, ZIP Code*)

MA 7-66
Apr. 1973

APPENDIX 4 S-398R74

Teacher Aid, Elementary School (education) 099.368

JOB DUTIES

Performs a variety of preparatory, instructional, supportive and clerical tasks under the direct supervision of certificated teaching personnel:

Arranges classroom and assembles materials for instruction by performing such duties as sharpening pencils; opening and closing windows; arranging furniture; watering plants and feeding small animals; obtaining supplemental instructional materials; creating and arranging appropriate grade related bulletin boards; distributing and collecting educational media used during lessons; and monitoring students who assist in general housekeeping duties.

*Assists teacher in classroom and related instruction by performing such duties as checking work of students and determining if exercises assigned by teacher are completed correctly; reading to the class from a designated story book; supervising students if teacher leaves the room; assisting (under supervision of teacher) in group or individual instruction of students in all subject areas; and operating audio-visual equipment.

Performs supportive, nonteaching tasks such as guiding students to and from various locations within the school; supervising playground, recess and cafeteria activity; reprimanding students and reporting to teacher any deviation from school rules and regulations; relating health conditions of student to nurse, teacher and parent; and comforting students if physically injured or in need of some emotional reassurance.

*Performs clerical and technical tasks such as collecting, recording and accounting for fund collections and lunch money; correcting papers and posting grades; filing information in students' record folders; cataloguing and distributing resource and reference materials; maintaining classroom supplies; typing materials and proofreading; setting up and operating duplicating machines; and maintaining attendance records.

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*These job duties are designated as critical job duties since they must be performed competently if the job is to be performed in a satisfactory manner. Teacher Aids spend about 80% of their working hours every day performing the job duties identified as critical job duties.

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